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PATENT

Attorney Docket No. 7393/71919

07-23-02

GW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

DE SADELEER

Application No.: 09/612,238

Filed: July 7, 2000

For: THE DEVELOPMENT OF VITAL WHEAT GLUTEN IN
NON-AQUEOUS MEDIA

July 12, 2002

CLAIM OF PRIORITY

MAILED

JUL 16 2002

Assistant Commissioner for Patents
Washington, D.C. 20231

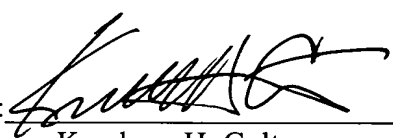
GROUP 1700

Dear Sir:

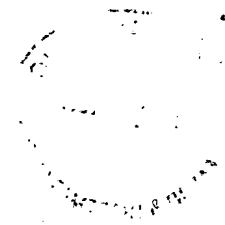
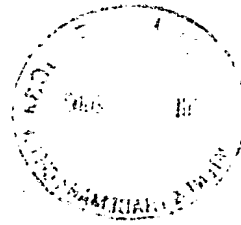
Submitted herewith in the above-identified application, through the undersigned attorney, Applicant hereby requests that their above-identified application be treated as entitled to the right accorded by Title 35, U.S. Code, Section 119, having regard to the application, whereby certified copy UK 9915787.7, filed 7 July 1999, of the priority document is enclosed.

Respectfully submitted,

FITCH, EVEN, TABIN & FLANNERY

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INVESTOR IN PEOPLE



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Concept House
Cardiff Road
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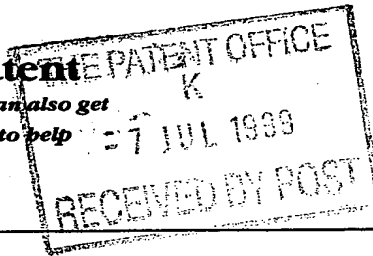
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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)



The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

SJW/7338

2. Patent application number

(The Patent Office will fill in this part)

9915787.7

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Cerestar Holding B.V.
Nijverheidsstraat 1
PO Box 9
4551 LA Sas van Gent
Holland

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

Holland

576 1051002

4. Title of the invention

"The Development of Vital Wheat Gluten in Non-Aqueous Media"

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Stevens Hewlett & Perkins
1 St. Augustine's Place
Bristol BS1 4UD
United Kingdom

Patents ADP number (if you know it)

1545002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.
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Continuation sheets of this form

Description

7

Claim(s)

1

Abstract

1

Drawing(s)

1 x 1

10. If you are also filing any of the following, state how many against each item.

Priority documents

-

Translations of priority documents

-

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

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Request for preliminary examination and search (Patents Form 9/77)

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Request for substantive examination (Patents Form 10/77)

-

Any other documents (please specify)

-

11.

I/We request the grant of a patent on the basis of this application.

Stevens Hewlett Perkins
Signature

Date 06/07/99

STEVENS HEWLETT & PERKINS

12. Name and daytime telephone number of person to contact in the United Kingdom

S J WILKINSON

0117 922 6007

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The development of vital wheat gluten in non-aqueous media

CER-97

Technical field

The present invention relates to the development of vital wheat gluten in non-aqueous media. The gluten which have been developed in such a way can easily be stored for a prolonged period. The gluten are used in the preparation of chewable consumable products, or in processed foods and feeds.

Background of the invention

Conventional chewing gums have achieved a broad success in the marketplace. Such chewing gums are typically made of a gum base and a coating. Both of these parts further contain compounds, which act as sweeteners, colourants, flavours, preservatives and processing aids. Such ingredients also serve to modify the bite and taste of the product.

Conventional gum bases may be chosen from natural or synthetic resins such as chicle, natural rubber, guttapercha, lechi capsii, sorva, guttakay, crown gum, butadiene-styrene copolymers, polyisobutylene, isobutylene-isoprene copolymers, polyvinyl acetate, and polyvinyl alcohol. The gum base, which is water insoluble and chewable further comprises elastomers, resins, fats, oils, waxes, softeners and fillers. As a softener or plasticiser the following molecules can be used lanolin, propylene glycol, glycerine or triacetin in amounts of up to 10 weight %. Other additives include fillers and anti-sticking agents.

The products used as basic ingredient for the gum base are not biodegradable and do not degrade upon chewing either. This distinguishes the chewing gum from the chewy candies, which are completely digestible. Disposal of conventional chewing gum can cause unsightly litter.

Wheat gluten have been tried as a digestible and biodegradable alternative to the mentioned gum base ingredients.

International patent application WO 95/12322 discloses the use of gluten as a gum base for chewing gum. In order to improve the chewability characteristics the gluten are cross-linked with a protein condensing agent, preferably tannin. It is recognized that the gluten-based chewing gums have a high moisture content, which renders the gums susceptible to microbial spoilage. In order to avoid this spoilage preservatives are added.

WO 94/17673 describes an improvement in the chew of gluten when used as a gum base wherein the improvement consists in the addition of a texturizing agent.

Despite the fact that gluten have found acceptance in a wide range of applications gluten have to date not gained a reasonable markets share in food or feed applications. One of the reasons therefore is the wide-spread belief that it is necessary to develop the gluten in an aqueous medium. Development in an aqueous medium results in the presence of too much water in the final product, which makes the product perishable due to the growth of microorganisms. The present invention solves this problem.

Summary of the invention

It is an object of the present invention to provide a digestible, degradable gluten basic composition which, can be stored for a prolonged period of time without degradation and which can be used as a gum base for chewing gums, chewable candies, and processed food or feed. The storage conditions are the normal storage conditions for gluten.

The present invention discloses a developed vital wheat gluten wherein the development was performed in a non-aqueous medium i.e. a medium having a A_w of less than 0.8, or with a A_w so that the final composition has a A_w less than 0.7

A preferred medium for developing the gluten is a concentrated carbohydrate solution, containing less than 30 % of water, preferably less than 20 %, more preferably less than 10 % (w/w).

The present invention also discloses a method for developing wheat gluten in a non-aqueous medium.

The present invention further discloses the use of the so-developed wheat gluten as a gum base for chewing gums, or as basis for chewing candies.

Wheat gluten developed in non-aqueous media has been applied in food applications but also in bakery and processed food. The wheat gluten was further applied in feed applications such as in pet food or fish feed.

Brief description of the figures

Figure 1 shows a Brabender Plastogram recorded on a Do-Corder DC 2200-3

(Brabender OHG, Duisburg), expressing the evolution of the torque (Nm) as a function of time when kneading a mixture of a gluten-glycerol-water (50:50:15) at 58° Celsius and 25 rpm.

Detailed description of the invention

It is an object of the present invention to provide a digestible, degradable gluten basic composition, which can be stored for a prolonged period of time without degradation and which can for example be used as a gum base for chewing gums or chewable candies. The present invention discloses a developed vital wheat gluten wherein the development was performed in a non-aqueous medium i.e. a medium having a A_w (water activity) of less than 0.8, so that the final composition has a A_w of less than 0.7.

In general terms the wheat gluten are developed by mixing a high concentration of vital wheat gluten with the non-aqueous medium of choice. Kneading of this mixture is continued until the torque is maximal (see Figure 1). It is especially at the maximum value of this torque that the product has excellent chewing properties. The product can now be used as a gum base. Since the wheat gluten were developed in a non-aqueous medium the product is stable towards microbial degradation and can be stored for several months without deterioration, under normal storage conditions This greatly adds to the flexibility of the use of vital wheat gluten.

In a typical preparation the kneading is performed at a temperature between 50 and 85 °C. The essence of the kneading is that sufficient energy has to be added to allow the gluten to unfold, and restore their interactions i.e. H-bridges, hydrophobic and ionic bonds, sulphur bridges and crosslinks. This means that there is some flexibility as to the type of kneader (type, continuous or batch, extruder...) and the conditions under which the kneader is employed.

The evolution of the torque (time to maximum) and the height of the torque can be influenced by altering the conditions of the kneading, i.e. temperature, faster kneading, inclusion of other ingredients or additives, etc. Some of these parameters are illustrated in the examples.

Kneading times are typically between 5 min and 1 hour preferably between 10 and 25 minutes.

Although the present invention relates to the absence of water typically up to about 20 % of water may be present. The limits for this are determined by the fact that the water activity (A_w) has to be such that microbial growth is not possible. This water activity limit depends to a certain extent on the type of microorganism.

In addition it should be noted that in the presence of water kneading becomes easier.

A preferred medium is a concentrated carbohydrate solution, containing less than 30 % of water, preferably less than 20 %, more preferably less than 10 % (w/w).

The amount of water, which is present during kneading influences the kneading conditions. Kneading becomes easier in the presence of water. In fact what is essential for the present invention is the water activity of the final product.

The present invention also discloses a method for developing wheat gluten in a non-aqueous medium.

The present invention further discloses the use of the so-developed wheat gluten as a gum base for chewing gums or chewing candies. The wheat gluten has been applied in food applications but also in bakery and processed food. The wheat gluten was further applied in feed applications such as in pet food. In such cases it may be necessary to process the gluten by cooking, baking or other means.

Examples

1. 50 g vital wheat gluten (94% dry substance (Gluvital® 21000)) were mixed with 50 g glycerol and 15 g of water, and kneaded in a Do-Corder (Brabender, Duisburg, 50 g bowl) at 58°C at 25 rpm. After 1 minute the torque increased, and reached a maximum of 6.5 Nm after 16 min, after which it started declining (see figure 1). The product recovered when kneading up to the top of the development curve has excellent chewing properties and can be used as gum base for e.g. chewing gum formulas.
2. 50 g vital wheat gluten (94% dry substance (Gluvital® 21000)) were mixed with 50 g glycerol and 6 g lecithin (Stern, Hamburg, and kneaded in a Do-Corder at 58°C at 25 rpm. After 4 minute the torque increased, and reached a maximum of 4.5 Nm after 18 min, after which it started declining. The product recovered when kneading up to the top of the development curve has excellent chewing properties and can be used as gum base for e.g. chewing gum formulas. The product was stable towards microbiological degradation, and was stored for several months.
3. 50 g vital wheat gluten (94% dry substance (Gluvital® 21000)) were mixed with 50 g glycerol, and 15 g water, and kneaded in a Do-Corder at 58°C at 25 rpm. After 2 minutes the torque increased, and reached a maximum of 6.5 Nm after 15 min, after which it started declining. The consistency of the product is higher than in example 1, and a different 'bite' was obtained. The water activity was still high enough to avoid microbiological degradation of the product.
4. 50 g vital wheat gluten (94% dry substance (Gluvital 21000)) were mixed with 50 g glycerol, and 5 g water, and kneaded in a Do-Corder at 58°C and a speed of resp. 25, 50, 100 and 160 rpm. It was found that the time to reach the high torque declines with increasing mixer speed.

5. 50 g vital wheat gluten (94% dry substance (Gluvital 21000)) were mixed with 81.25 g (80% dry substance) glucose syrup (C☆Sweet™ D 01608, Cerestar), 18.75 g water, 1 g of lecithin, 3 g of cocosfat, 10 g of tapioca starch in the 50 g bowl of the Do-Corder at resp. 40. 60 and 80°C, at 150 rpm. Increasing the temperature hardly influences the level of the maximum torque, but drastically influences the time at which this maximum is reached.
6. 50 g vital wheat gluten (94% dry substance (Gluvital 21000)) were mixed with 81.25 g (80% dry substance) glucose syrup (C☆Sweet D 01608, Cerestar), 18.75 g water, 1 g of lecithin, and 3 g of cocosfat in the 50 g bowl of the Do-Corder at 58°C and kneaded at 150 rpm. The product was a directly consumable chewable product.
7. 50 g vital wheat gluten (94% dry substance (Gluvital 21000)) were mixed with 81.25 g (80% dry substance) glucose syrup (C☆Sweet D 01608, Cerestar), 18.75 g water, 1 g of lecithin, 3 g of cocosfat, 10 g of rice flour and 0.1 g of mint flavour in the 50 g bowl of the Do-Corder at 58°C and 150 rpm. The maximum torque is the same as without the filler (rice flour), but the maximum is reached after a shorter time, due to the higher dry substance of the mixture. The product was a directly consumable chewable product.
8. A product was produced as in example 6, and after kneading to its maximal torque it was shaped after which it was fried yielding snacks.

A part of the same product was baked (conventional, microwave or combi-oven) yielding nice bakery products with baguette-like crumb structure.

9. 40 g vital wheat gluten (94% dry substance (Gluvital 21000)) were mixed with 40 g of dried (96% dry substance) corn germs (40% oil) and 25 g of water, and kneaded in the 50g bowl of the Do-Corder at 58° C and 25 rpm. A nutritionally excellent product is generated for pets that easily can be further processed cooked, fried, baked, sterilised in cans, etc. It is also an excellent fish feed, both through its composition (high protein, high fat, low carbohydrates) and its properties (consistant mass that is not desintegrating when dropped in water).
10. 50 g of vital wheat gluten 94% dry substance (Gluvital 21000) were mixed with 50 g of corn gluten (88% dry substance) and 25 g of water in the 50 g bowl of the Do-Corder at 58°C and 25 rpm. A nice, nutritionally very interesting product was obtained that can be shaped and further processed through the normal processes applied in pet food, animal feed and fish feed.

example	onset develop. (min)	max. torque (Nm)	time to max. (min)	time to 9 Nm (min)
1	1	6.5	16	
2	4	4.5	18	
3	2	6.5	15	
4 (25 rpm)	5			21
4 (50 rpm)	3			13.5
4 (100 rpm)	2			12
4 (160 rpm)	1			5.5
5 (40°C)	4	3.5	58	
5 (60°C)	3	3.5	11	
5 (80°C)	2	3	6	
6	9	3.5	19	
7,8	4	4	12	
9	1	4	10	
10	1	5	3	

Claims

1. A method for developing wheat gluten characterized in that the wheat gluten are developed in a non-aqueous medium.
2. A method according to claim 1 wherein the non-aqueous medium contains less than 20% of water, preferably less than 15%.
3. A method according to claim 1 wherein the non-aqueous medium has a water activity which is below 0.8
4. A method according to claim 3 wherein the final product has a water activity of less than 0.7.
5. A method according to claim 1 or 2 wherein the non-aqueous medium is a concentrated carbohydrate syrup.
6. A method according to claim 4 wherein the carbohydrate is selected from the group consisting of glycerol, glucose, fructose, sucrose, invert sugar, sorbitol, and lactose.
7. A food or feed product comprising a wheat gluten which has been developed in a non-aqueous medium.

FIGURE 1

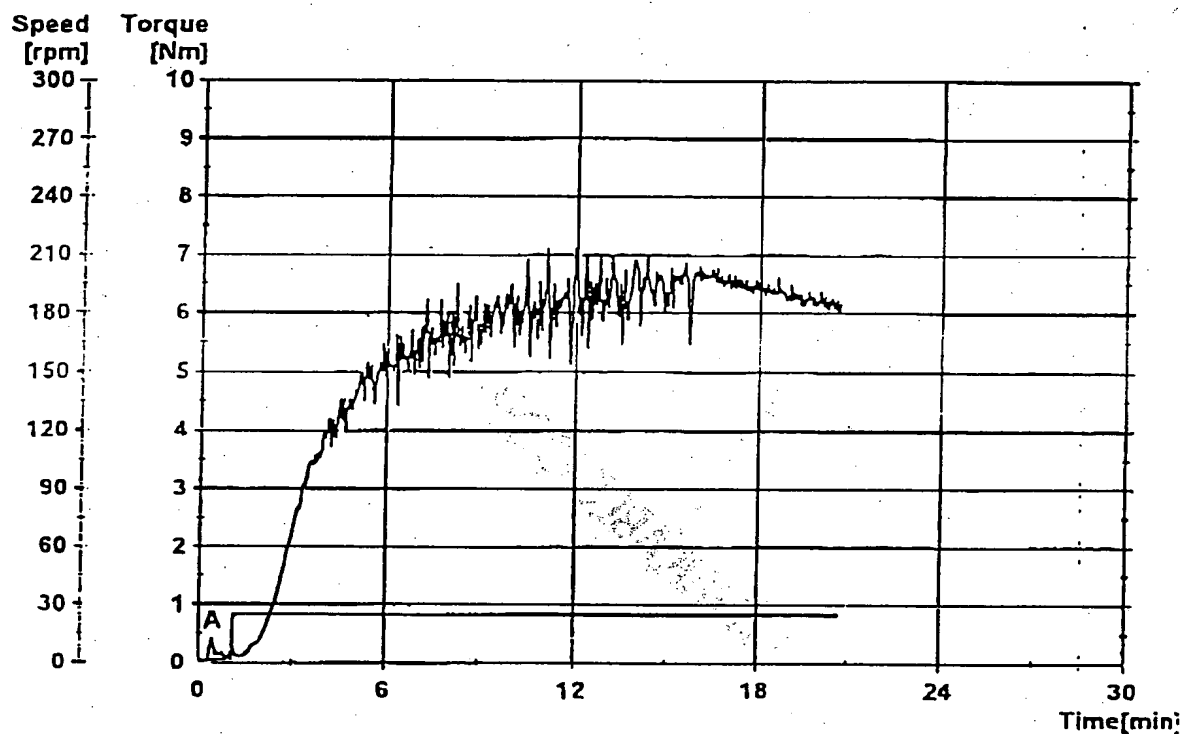
BRABENDER Plastogram

PLASTI-CORDER and Mixer Measuring Head Semi-Automatic Universal Evaluation

Test Conditions

Order : CoE RM&C
Operator : g.moureau
Date : 15/09/98 01:39
Drive Unit : PL2200-3
Mixer : W 50
Loading Chute : Manual + 5 kg
Sample : glu50-glycerol50
Additive : water 15

Speed : 1 rpm
Mixer Temp. : 37 °C
Start Temp. : 24 °C
Meas. Range : 2 Nm
Damping : 3
Test Time : 31 min
Sample Weight : 50.50 g
Code Number :



	Time [h:m:s] 0-X	Time [h:m:s] X-X	Torque [Nm] at X	Temp. [°C] at X	Energy [kJ] 0-X	Energy [kJ] X-X
A	00:00:00	00:00:00	0.0	24	0.0	0.0

gluten 50 %
glycerol 50 %
H₂O 15 %

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The development of vital wheat gluten in non-aqueous media

CER-97

Abstract

The present invention relates to the development of vital wheat gluten in non-aqueous media. The gluten which have been developed in such a way can easily be stored for a prolonged period. The gluten are used in the preparation of chewable consumable products, or in processed food and feed.

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